

REMARKS

Claims 1, 4-6 and 9 are pending. Claims 2, 3, 7-8 and 10 are cancelled. Claim 1 is currently amended.

Under Examiner's comment's, the Examiner states that the recitation in claim 1 of "...prior to charging the feed material..." is not positively claimed, and if to be given patentable weight this should be amended. Applicants have amended claim 1, including the limitation of: "charging the pre-dried, reclaimed feed material at a temperature of about 150° C to a gas-based direct reduction furnace." Support for the limitation is found on page 9 lines 6-7.

The Examiner has stated that the amendment made on 05/26/26 is not supported by the original disclosure, and the phrase "where the hot waste off-gas" changes the scope of the original disclosure. Amendment is required, and Applicants have currently amended the specification deleting the phrase "where the hot waste off-gas". Applicants have also deleted "where" which was not in the original specification, and restored "is", therein returning the paragraph to its original wording.

The Examiner has requested that Figure 2 be designated "Prior Art". Figure 2 is currently corrected, and a replacement sheet and the marked up sheet are attached.

Claims 1, 4-6 and 9 stand rejected under 35 U.S.C. 112 as failing to comply with the written description. In particular, the Examiner states that "on page 4, the original disclosure (pp.8-9) clearly requires heating ore to at least about 200°C, but preferably to at least 300°C." Examiner opines that this is new matter, and has issued a new matter rejection. Applicants respectfully disagree. There is no new matter. Page 5, lines 19-23 of the specification states "It has now been determined that a combined pretreatment of Corumba lump ore, will cause a dramatic reduction in fines generation: pretreatment combines storage in piles followed by pre-drying at low temperatures (< 200 C), which

is followed by low-temperature reduction in the furnace”. On page 6, line 1, Corumba lump ore is described as “mainly constituted of micropores”. Furthermore, claim 3 in the original specification claims “A process according to claim 1, wherein the feed material is pre-dried at a temperature of about 200 C”. The temperature of about 200 C is again cited on page 9, line 21. Applicants assert that these citations establish the temperature at about 200 C; and there is no new matter. The temperature limitation is supported by the original claims and multiple times in the specification. The Examiner’s cited reference on page 8, line 23 reads on at least about 200 C and 300C, adding that the citation also states that cooling air is added as necessary. In the broadest scope, the disclosed invented method is not limited to a solid sedimentary iron ore consisting of a microstructure mainly constituted of micropores, however, the current claims are limited to this type of ore. Where the specification is specifically concerned with a microporous solid sedimentary iron, the lump ore is not heated hotter than about 200°C in the pre-drying step to minimize the formation of fines. The Examiner further asserts that a temperature $\leq 0^{\circ}\text{C}$ one would not be able to dry the ore to less than 0.5 wt% water. Examiner is in error, as water vapor sublimates $\leq 0^{\circ}\text{C}$, and drying would be possible. However, claim 1 is currently amended to read on the moisture range taught on page 9, line 5, which is less than about 0.5% at a temperature of about 200° C. Also, as previously stated, on page 9, line 6, the specification teaches that the introduction temperature is about 150°C; and claim 1 is currently amended to include this temperature limitation. Therefore the enablement rejection is moot. The 112 rejection of Claim 1 is respectfully traversed.

Claims 1, 4-6 and 9 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Ando et al. (US Patent No. 3,831,913) in view of Applicants admitted prior art (specification page 4 lines 10-14). Ando et al. discloses a method for reducing iron in a rotary kiln, where iron is lumps of ore dried to 0.5% water. Ando et al. teaches (see col. 10, line 14) metallizing the feed material at 1100° C, after compounding a pellet and then drying it to 0.5% moisture. Applicants’ teach a cost savings method of using lump ore, as compared to a pellet. Ando et al. does not teach the utility of using lump iron ore, nor the utility of storing iron ore for a predetermined time of at least one month in an open atmosphere, therein providing time to release internal stresses of the solid sedimentary

iron ore consisting of a microstructure mainly constituted of micropores lump feed material. Ando et al. is metallizing fines in the form of compounded pellets, while Applicants' invention is a method of eliminating / reducing fines, and not forming pellets. The Ando et al. reference in essence teaches what to do with fines, for instance, if the Applicants' process isn't employed. In contrast, Applicants admitted prior art teaches a lump ore and pre-drying at low temperatures. Therefore, it is improper to combine a reference that does not share any commonality with Applicants admitted prior art. The Examiner cannot have it both ways. The Examiner is arguing any temperature and any feed material will work. Ando et al. is of minimal relevance. Furthermore, Ando et al. provides no temperatures for the pre-drying. The recycled hot drying gases used by Ando et al. are laden with sulfur. Adding sulfur to the iron is generally not considered desirable by the iron making industry. Examiner admits that Ando et al. does not teach the pre-drying temperatures. Examiner admits that Ando et al. does not store ore for at least one month, and yet the Examiner is improperly combining Ando et al. with the Applicants admitted prior art. The combination is improper, the Ando et al. reference is not relevant, and the rejection is respectfully overcome.

Claims 1, 4-6 and 9 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Villarreal-Trevino et al. (US Patent No. 6,395,056) and Applicants admitted prior art. Examiner admits that Villarreal-Trevino et al. does not store ore for at least a month, and that the pre-drying temperature is not about 200°C. The Examiner states that Villarreal-Trevino et al., in a reference in the application, teach that sedimentary lump ore (page 4, lines 10-14) needs to release stress. The reference in the specification to page 4, lines 10-14 is not a teaching by Villarreal-Trevino et al. Furthermore, the Applicants admitted prior art reference does not read on sedimentary lump ore consisting of a microstructure mainly constituted of micropores, which is especially sensitive to forming fines. Villarreal-Trevino et al. teaches that weakening occurs when hematite is converted to magnetite (col. 2, line 2), but that this weakening is slight if the reduction time is kept under 75 minutes. In other words, Villarreal-Trevino et al. teaches that faster pre-drying is better to prevent weakening. Villarreal-Trevino et al. teaches pre-heating at 700°C in an oxidizing atmosphere to convert hematite to magnetite. Applicants' process does not share similar steps. Applicants'

claimed process does not initially employ heating, but instead requires that the ore rest for a month, and then, when it is heated, the temperature is about 200°C. As taught on page 5, line 19 of the specification, the high temperature approach taught by Villarreal-Trevino et al. produced 40% fines using Corumba iron ore lumps. The two processes are totally different and at odds, and in fact, Villarreal-Trevino et al teaches away from Applicants' method. Again, the combination of references is improper, as Applicants admitted prior art teaches low temperatures, and Villarreal-Trevino et al. teaches very high temperatures. The rejection is respectfully overcome. With regards to claims 4 and 5, the Examiner states that Villarreal-Trevino et al. does not teach what temperatures are used. Applicants assert that the Examiner is wrong, and in fact Villarreal-Trevino et al. does cite the temperatures. They are given in col. 2, line 50 as 750°C to 1100°C. Claim 5 reads on the temperature of the waste off-gas, which is in excess of 300° C, **not** the temperature of the iron ore. The iron ore is about 200°C. With respect to dependent claim 6, claim 6 draws its novelty from intervening claim 4 and independent claim 1. The rejection is respectfully traversed.

Claims 1, 4-6 and 9 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Stephens Jr. (US Patent No. 5,810,906), alone or in view of Meissner et al. (US Patent No. 5,437,708), and Applicants admitted prior art (specification page 4 lines 10-14). Stephens teaches that the iron oxide material is oxidized for 2-10 minutes (col. 3, lines 49-50) at 300° C to 700° C (col. 3, line 36) with pretreated air that is 1000° C - 1600° C. Applicants' admitted prior art teaches low temperatures, and again the combination of references is improper. Claim 1 claims treatment for 1 month at ambient temperatures, followed by pre-drying at about 200°C. The time frames of the two inventions are not even close, and Applicants' pre-drying temperature is at least 100° C cooler using the disclosed and claimed process. Stephens is not concerned with reducing fines, nor with sedimentary iron ore consisting of a microstructure mainly constituted of micropores, nor any particular type of ore; and the referenced patent is conspicuously absent any mention of the term "fines". While the Applicants admitted prior art reads that some sedimentary lump ores may requires a lump storage time, it does not read on the storage conditions, nor on the storage time, nor on the

introduction temperature of about 150° C into the furnace, as taught on page 9, line 7. The rejection of claim 1 is respectfully overcome.

Claims 4-6 and 9 depend from independent claim 1, and derive novelty in part from their dependency. Furthermore, Applicants' and Meissner's exhaust gases are from a DRI process, while Stephens' exhaust gases are from oxidizing steps that burn the sulfur out of the ore, therein generating sulfur dioxide (col. 2, line 67). Applicants' exhaust gases can be combined with cooling air 28, as necessary (page 8, line 25). Meissner teaches that the waste gases can indirectly be used to heat the reformer. Applicants claim in claim 4 that the waste gases are introduced to the storage bin. Several elements distinguish the Applicants' invention from the cited prior art, weakening the basis for the Examiner's rejection. As taught by the cited prior art sulfur dioxide would be added to the storage bin. Applicants do not wish to increase the content of sulfur, as this would merely lower the quality of the iron ore, and, combined with cooling air 28, create more emission gases that will need to be cleaned. Secondly, Meissner teaches away from combining Stephens' process with Meissner's process. Meissner teaches that waste gases can be used indirectly via a heat exchanger to heat the reformer. Meissner does not teach a process where waste gases, especially those laden with sulfur dioxide, come into direct contact with the iron ore, as shown in Stephens' steps 18 and 30. Meissner recognizes that diluting gases laden with sulfur dioxide is not useful. The combined references are in direct conflict. Therefore, the rejections of claims 4 and 6 are respectfully overcome, and dependent claims 4-6 and 9, by virtue of their dependence on claim 1 are likewise allowable.

The Examiner has issued a provisional double patenting rejection. The allowed claims of the co-pending case 10/789,696 read on a different type of ore and a different process. The allowed claims of co-pending case 10/789,696 do not read on:

“storing solid sedimentary iron ore consisting of a microstructure mainly constituted of micropores iron ore lump feed material for a predetermined time of at least one month in an open atmosphere, therein providing time to release internal stresses of the sedimentary iron ore lump feed material;

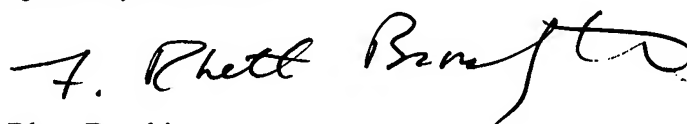
reclaiming the solid lump feed material stored for at least one month”.

There is no overlap. There is no provisional double patenting. However, if the Examiner allows this case, contingent on a terminal disclaimer, Applicants will reconsider issuing a terminal disclaimer.

Since the amendments to the claims do not add more claims than previously paid for, no additional fee is required for the claims.

In view of the foregoing amendment and these remarks, this Application is now believed to be in condition for allowance and such favorable action is respectfully requested on behalf of Applicants.

Respectfully submitted,



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Annotated Marked-up Drawing

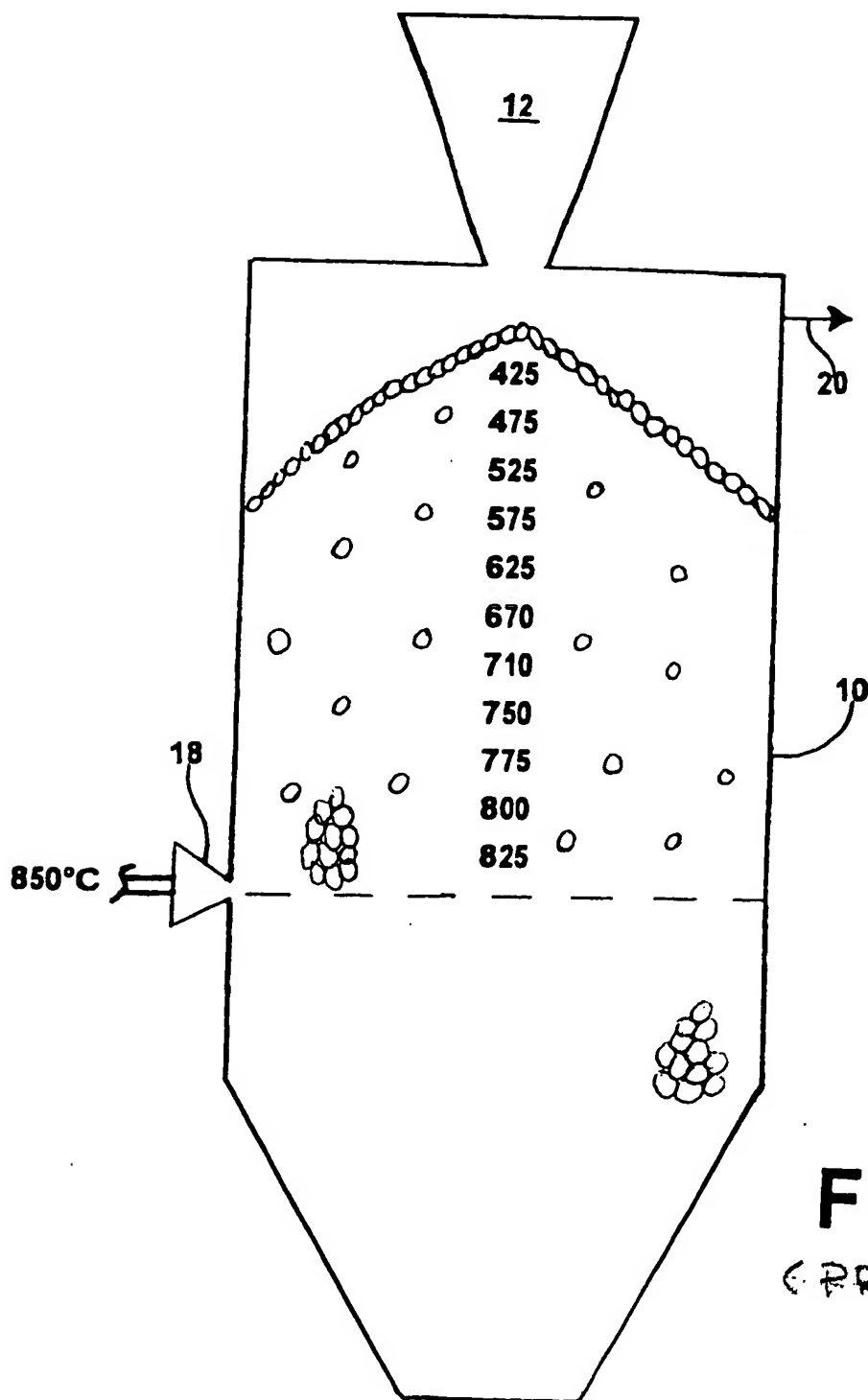


FIG. 2
(PRIOR ART)